IS 8165 (2010): Test chart for manually operated dividing heads for machine tools [PGD 3: Machine Tools]

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IS 8165 : 2010
ISO 5734 : 1986

भारतीय मानक

मशीन उपकरण के लिए यांत्रिक डिवाईडिंग हेड की स्वीकृति अनुकूलता — परिशुद्धता परीक्षण

(पहला पुनरीक्षण)

Indian Standard

ACCEPTANCE CONDITIONS OF MECHANICAL DIVIDING HEADS FOR MACHINE TOOLS — TESTING OF ACCURACY

(First Revision)

ICS 25.080.20

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

November 2010 **Price Group 4**

Machine Tools Sectional Committee, PGD 03

NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical with ISO 5734 : 1986 'Acceptance conditions of mechanical dividing heads for machine tools — Testing of accuracy' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Machine Tools Sectional Committee and approval of the Production and General Engineering Division Council.

This standard was first published in 1976. The first revision has been taken up to align with the latest ISO Standard.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

c) Some dimensions appears in 'inches' in the International Standard besides in metric systems, while in Indian Standards, the current practice is to give metric values only.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard which is to be substituted in its place is listed below along with its degree of equivalence for the edition indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 230 (Part 1) : 1996 Test code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or finishing conditions	IS 2063 (Part 1) : 2002 Test code for machine tools: Part 1 Geometric accuracy of machines operating under no-load or finishing conditions (*second revision*)	Identical

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ACCEPTANCE CONDITIONS OF MECHANICAL DIVIDING HEADS FOR MACHINE TOOLS — TESTING OF ACCURACY

(First Revision)

1 Scope and field of application

This International Standard specifies, with reference to ISO 230/1, geometrical tests on general purpose and normal accuracy mechanical dividing heads for use on machine tools, and the corresponding permissible deviations that apply.

It deals only with the verification of the accuracy of the device. It does not apply to the running of the device, which should generally be checked before the accuracy is tested.

2 Reference

ISO 230/1, *Acceptance code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or finishing conditions.*

3 Preliminary remarks

3.1 In this International Standard, dimensions and deviations are expressed in millimetres and in inches.

3.2 To apply this International Standard, reference should be made to ISO 230/1, especially for the description of measuring methods and the recommended accuracy of testing equipment.

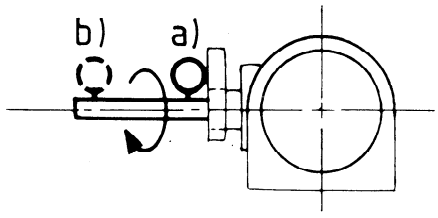
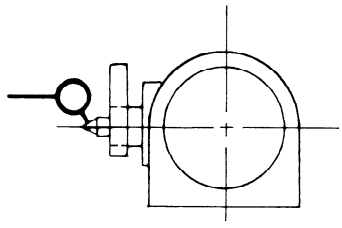
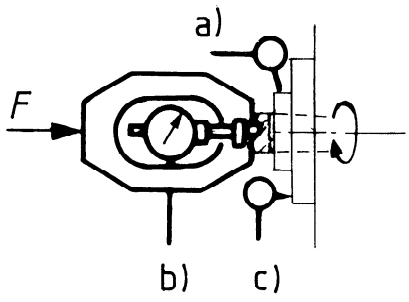
3.3 The sequence in which the geometrical tests are given is related to the sub-assemblies of the device, and this in no way defines the practical order of testing. In order to make the mounting of instruments or gauging easier, tests may be applied in any order.

3.4 When inspecting a device, it is not always necessary to carry out all the tests given in this International Standard. It is up to the user to choose, in agreement with the manufacturer, those relating to the properties which are of interest to him, but these tests are to be clearly stated when ordering a device.

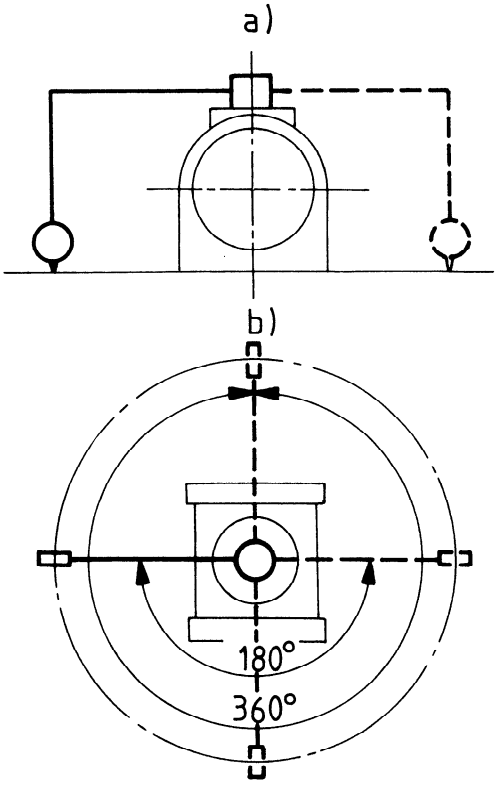
3.5 When establishing the tolerance for a measuring range different from that given in this International Standard (see 2.311 in ISO 230/1), it should be taken into consideration that the minimum tolerance value is 0,01 mm (0.000 4 in).

3.6 For reasons of simplicity the diagrams in this International Standard illustrate only one type of machine.

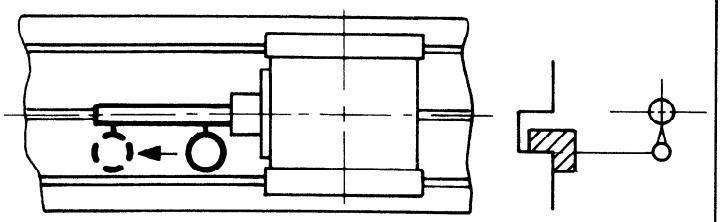
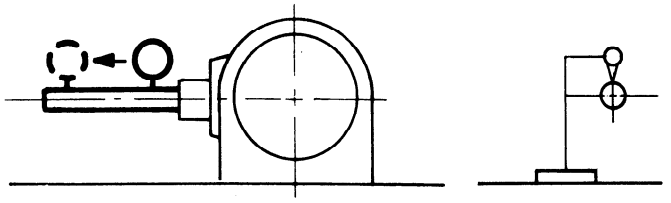
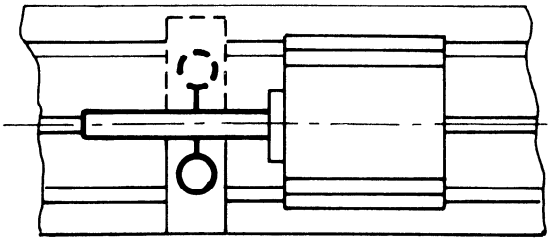
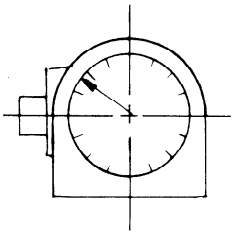
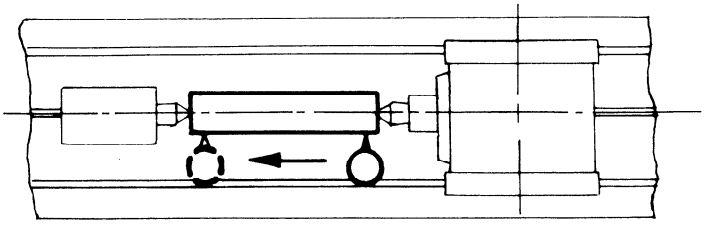
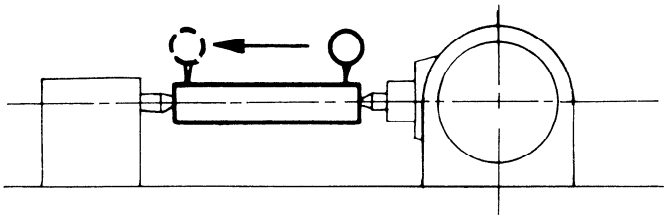
4 Acceptance conditions and permissible deviations

No.	Diagram	Object
G1		Measurement of run-out of the internal taper of the spindle: a) at the mouth of the taper; b) at a distance of 300 mm (12 in) from the face of the spindle nose.
G2		Measurement of run-out of the centre.
G3		a) Measurement of run-out of the spindle external register diameter. b) Measurement of periodic axial slip. c) Measurement of camming of the face of the spindle nose (including periodic axial slip).

Permissible deviation				Measuring instruments	Observations and references to the ISO 230/1 acceptance code
mm		in			
a) b)	0,01 0,02	a) b)	0.000 4 0.000 8	Dial gauge and test mandrel	Sub-clause 5.612.3
	0,01		0.000 4	Dial gauge	Sub-clause 5.612.2
a) b) c)	0,01 0,01 0,02	a) b) c)	0.000 4 0.000 4 0.000 8	Dial gauge	a) Sub-clause 5.612.2 For a tapered spindle nose, the dial gauge shall be set perpendicular to the generatrix of the taper. b) and c) Sub-clauses 5.62, 5.621.2, 5.622.1, 5.622.2 and 5.632 For the position of the dial gauge, see figures 59 to 64 and 67, sub-clauses 5.622 and 5.632. The value of force F to be applied when carrying out checks b) and c) shall be specified by the manufacturer.

No.	Diagram	Object
G4		Checking of squareness of the spindle axis with the supporting surface of the dividing head. NOTE — For dividing heads fitted with detent pins to retain the spindle in the vertical position, the location provided by the detent pin should be verified.

Permissible deviation		Measuring instruments	Observations and references to the ISO 230/1 acceptance code
mm	in		
0,02/300*	0.000 8/12*	Dial gauge	Sub-clause 5.512.1 Mount dial gauge on spindle. Set dividing head with spindle vertical by use of detent pin. Where there is no detent pin, set the dial gauge as shown in a) so that the dial gauge reads zero when swung through 180°. For all dividing heads, readings should then be taken through 360° of spindle rotation as shown in b). The deviation is the largest difference between the dial gauge readings. * Distance between the two points touched.

No.	Diagram	Object
G5	a)  b)  c) 	a) Checking of parallelism of the locating tenon to the spindle axis; b) Checking of parallelism of the spindle axis to the clamping surface. NOTE — Test b) is only necessary if location of spindle is by detent pin. c) Checking of lateral offset of spindle with respect to central T-slot.
G6		Checking of maximum permissible dividing error: a) in the output shaft rotation for one complete revolution of the input shaft (i.e. for a normal 40/1 ratio dividing head, a 9° rotation is implied); b) for any chosen angles of the output shaft. This test should be carried out for one angle situated in each of the four quadrants.
G7	a)  b) 	a) Checking of parallelism of the working axis with the median T-slot. b) Checking of parallelism of working axis with the clamping surface of the device.

Permissible deviation		Measuring instruments	Observations and references to the ISO 230/1 acceptance code
mm	in		
a) and b) 0,015 for any measuring length of: 300 c) 0,015	 0.000 6 12 0.000 6	Dial gauge and test mandrel	Sub-clauses 5.412.1 and 5.412.4 The measurement shall be carried out on two diametrically opposed generatrix of the mandrel, after the spindle has been rotated through 180°. The tolerance is equal to the algebraic mean of the measurements. Tenons adjusted, if necessary. Sub-clause 5.442 Dial gauge is rotated through 180° to touch each side of the test mandrel. Tenons adjusted, if necessary.
a) ± 45″ or maximum width of tolerance band of 1′30″ of arc b) ± 1′ or maximum width of tolerance band of 2′ of arc		Reference plate	a) Sub-clause 6.111 This test eliminates any error in the plate for the hole and pin type. b) Sub-clause 6.114 The permissible deviation includes the transmission errors in any type of dividing head as well as errors in the plate for the hole and pin type. This test should be made for each direction of rotation to evaluate the reversal error.
a) 0,02 for any measuring length of: 300 b) 0,02 for any measuring length of: 300	a) 0.000 8 12 b) 0.000 8 12	Dial gauge and test mandrel	Sub-clause 5.412.4 Test mandrel held between centres: a) tenons adjusted, if necessary; b) height adjusted, if necessary.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard alongwith amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: PGD 03 (1036).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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